SESSION XIX
P² SUCCESS STORIES

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P2 Success Story: Fort Lewis Fuel & Water Recovery Program (#128)

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Introduction: This paper will celebrate a pollution prevention success story. The paper will be viewed from the past present and future. The past perspective will show good hazardous waste management with tons of value being manifested off-site. The present perspective will show the end of a waste stream and the beginning of a new on-site recycling industry. The future will show maintenance revolutionized and practically all off-site vehicle process waste eliminated and recycled.

The Past: For many years, tens of thousands of gallons of contaminated diesel and JP-8 were sent off-site in drums as hazardous waste. And for many years we have had a significant commitment of manpower and money dedicated to the management of contaminated fuel. The most common problem with all the wasted fuel was water and dirt contamination. Fuel tanks on vehicles or in underground tanks suffer from the same problem. Moisture from the air condenses and collects on the bottom of the tanks. Microscopic organisms live in the water and eat the fuel. As the organisms eat and die, the water becomes saturated with slime and sludge that builds up on the tank bottom and eventually clogs filters. The only effective method of dealing with this problem in the past was to pump the tanks empty and dispose of the contaminated fuel off-site through D.R.M.O. Even if waste disposal were free, the re-purchase of fuel alone makes this practice a loss of value.

Any waste we generate is a potential liability due to it's associated environmental risk. When we pay private companies to manage the disposal of our waste we are still not free of the liability for environmental damage if something goes wrong. The law makes us liable for our waste from cradle to grave. For this reason we are always looking for ways to decrease the amount of waste sent off-site, thus decreasing our potential liability. When we manage things on-site we retain complete control. If we can turn contaminated fuel into useable fuel on-site we save money and sleep better at night.

The Present: We are now managing the collection and storage of the contaminated fuel on-site and in bulk tanks rather than in drums. We pay industrial contractors for the technology service that recycles the fuel at our central bulk facility rather than sending drums of waste fuel off-site. The recovered fuel is then analyzed by the US Army Petroleum Laboratory, and donated back to the soldiers for use in tracked armored vehicles. The water that was removed from the fuel is cleaned to meet local pretreatment standards for discharge to the sanitary sewer. We now spend far less money on recycling services than off-site waste management and disposal. We also have the added benefit of the recovered fuel for donation back to the Army units. By managing the fuel as a recyclable commodity we have lightened the annual dangerous waste-reporting burden. By handling the fuel in bulk we spend less money on the purchase of disposal drums.

Economic Benefit: For each gallon of contaminated fuel handled by this program, Fort Lewis, the US Army and the taxpayers save **$1.44** compared to the previous practice. In 1997, we processed over sixty-five thousand gallons of contaminated fuel. From that contaminated fuel we harvested 50,000 gallons of good fuel for an estimated cost saving of **$93,600**. The recycled fuel was issued to and consumed by US Army main battle tanks. Nearly 500,000 pounds of waste reduction has been achieved during the past eighteen months of the program. Local leaders that were at first skeptical have now "bought in" to the idea that recycled fuel is OK. We have constructed a new production facility that is especially designed for the on-site recycling of fuel, water and other liquids. The total capital investment for this project was $152,000. Operations and maintenance costs for the previous practice cost over $190,000 per year. The new program costs $61,000 per year. Payback for this project is 1.17 years and has an estimated net present worth of $926,264. In this age of ever shrinking budgets and ever increasing responsibilities we are very proud of this achievement and the on-going opportunity to add value to the Army mission. Consider the table below for a comparison of the old way with the new way.

Direct Savings per Gallon.

ITEM	OLD	NEW
Labor	**NA**	**NA**
Original Purchase Cost	**NA**	**NA**
Re-Purchase Cost	**$.80**	**NA**
Average Disposal Cost Per Gallon	**$1.54**	**$0.00**
Average Recycling Charge Per Gallon	**NA**	**$0.90**
Total Direct Cost Per Gallon	**$2.34**	**$0.90**
Direct savings Per Gallon	**NA**	**$1.44**

Continuing Developments: We have conducted successful trial runs with solvent; petroleum based hydraulic fluid and fire resistant hydraulic fluid. We now intend to apply the same techniques to these commodities that we have with the fuel. Perhaps we can eliminate several more waste streams by recovering and reusing the same coolants and lubricants over and over. Now that we have found real value in what was previously considered waste, we are anxious to try it again.

On-Site Recycling Helps Us Meet Our Goals: Turning waste into reusable fuel on-site is by far the most important achievement of this program. Our higher headquarters mandates us to achieve four goals. Our first goal is to maintain 100% environmental compliance. Our second goal is to minimize negative impacts to Army training. Our third goal is to simplify environmental requirements for the soldiers. Our fourth and final goal, environmental stewardship is what we must strive toward. We are delighted by the fact that in this program we can claim true progress toward all of our goals.

The **goal of 100% compliance** is more easily achievable as we remove waste streams that must be managed under the hazardous waste regulations. Managing contaminated fuel as a recyclable commodity is cheaper than managing it as a hazardous waste. Environmental compliance under the Resource Conservation and Recovery Act or RCRA (hazardous waste regulations) is tough and expensive. The State version of this federal law is no less forgiving. There are special requirements for accumulation, storage, handling, transportation, and disposal. There are special training requirements for personnel that handle any waste regulated under RCRA. Special inspections and reports are required under the hazardous waste regulations. This on-site fuel-recycling program allows us to manage the contaminated fuel as if it were never a waste. And indeed it is no longer a waste. This on-site fuel recycling program helps us maintain 100% environmental compliance.

Minimize negative impacts and simplify environmental requirements: In the case of this program the second and third goals are achieved together. Our mission at Fort Lewis is to maintain and train troops for combat. Anything that distracts or takes away from that mission is considered a negative impact on Army training. Environmental requirements placed upon the troops that are confusing and complicated are consequently an impediment to that training mission. The on-site fuel recycling procedures are less complex for the soldiers and thus directly benefit the training mission by making contaminated fuel management easier.

Environmental stewardship is achieved as a result of this program in several ways. Waste reduction is beneficial to the environment and the economy. Less total demand for petroleum production is required from the global reserves when we reduce the amount of waste fuel we generate. By wasting less, we handle and haul less and therefore decrease the risk of fuel spills to the environment. By spending less money on waste management, we require less money to operate. By assigning a positive value to the contaminated fuel, we help decrease the likelihood of the contaminated fuel becoming abandoned hazardous waste and threatening the environment. By using the fuel for its intended purpose we restore the highest value back to the commodity.

The soldiers at Fort Lewis have an important real world mission. As environmental professionals we have the mission of **lifting the environmental burden** from the soldiers. This allows them to avoid distractions from their training mission. Our on-site recycling program empowers us to provide more comprehensive

and responsive customer service to the soldiers. Recycling fluids on-site is simpler and cheaper to manage than sending hazardous waste off-site.

Results Are Replicable: This on-site fuel-recycling program is 100% replicable and exportable to any place that generates contaminated fuel. The highly technical aspects of this program were all out-sourced by outside technology providers that are portable to any place at any time. No new technology has been invented as a result of this program. This program has merely utilized a different application of existing technologies. Government facilities are perhaps the most likely candidates for getting the best advantage from this type of program. Facilities with the largest fuel waste streams will receive the most dramatic results and fastest payback on capital investment. A new on-site recycling industry has started.

The Last Remaining Problem: Cross contamination of fluids during collection is the most prevalent reason that causes failure for any kind of liquid recycling program. Straight JP-8 contaminated with water and dirt is very easy and cheep to process. However, when used motor oil is added into the mixture, the recycling task becomes more difficult and expensive. JP-8 and small amounts of gasoline create a mixture that is not safe for our program to deal with effectively. We provide separate collection containers for all waste generated on post. We also spend a large amount of time and effort on our education program and public out reach to address the cross contamination issue. But the problem of cross contamination still exists. People in a hurry to get the fluids drained do not care enough to take a few extra seconds to use separate containers for different fluids.

The solution to the cross contamination problem can be found in an **improved collection system**. As long as the spent fluids remain as segregated as they are inside the vehicle they can be recycled. We have noticed that draining fluids into pans and cans is where the cross contamination begins. The antifreeze is drained into the same pan that was previously used to collect the engine oil. The oil residue from the pan is mixed into the antifreeze and goes into the antifreeze collection container. Fortunately the oil floats to the top and does not present much of a problem. The big problem comes when miscible products get mixed together. The fluid collection system must have the ability to evacuate fluids through dedicated pathways that are hard piped to dedicated bulk collection tanks to await the recycling process.

The Future: Construct a facility that would operate similar to Jiffy Lube, Q Lube and other commercial establishments for tactical military vehicles. The purpose of the facility would be to provide rapid fluid evacuation and filter change for all coolants and lubricants. Additionally, the majority of the coolants and lubricants taken from the vehicles could be recycled and reused on-site. The estimated economic benefits from this proposed facility are numerous. However, the most significant and immediate payoff would be an enormous reduction in maintenance and waste management requirements on the military personnel.

Strategy: By using the same fluids over and over again in the tactical Army vehicles, a large amount of money can be saved. Tests have shown that it is possible to recycle on-site many fluids such as fire resistant hydraulic fluid, antifreeze and petroleum based hydraulic fluid and motor oil. In the case of waste streams that can not be recycled on-site, the off-site bulk recycling option could be easily exercised. The largest challenge faced by fluid recyclers is cross-contamination of fluids. Bulk collection through dedicated vacuum lines into dedicated bulk tanks will completely eliminate the possibility of cross contamination and enable recyclers to provide competitive recycling rates.

The prototype for the fluid recycling portion of the facility already exists on Fort Lewis where contaminated fuel is segregated prior to being processed and recycled. The vacuum fluid handling equipment necessary to pipe the used fluids into bulk collection tanks and dispense the recycled fluids back into the vehicles is easy to obtain. Only minor modifications would be required for refitting a modern civilian fluid evacuation and replacement facility into one suitable for Army use. An in-house design study would reveal how many service bays and technicians would be required to serve the Army efficiently.

Additional Benefits: By centralizing the fluid evacuation process, the environmental reporting burden could be substantially reduced. Currently the environmental staff relies upon units conducting quarterly hazardous materials inventories. The existence of the centralized facility could greatly reduce and

simplify this unit requirement. By handling all fluids in bulk, the proposed facility would eliminate the disposal of many tons of empty containers each year. Any additional purchase of coolants or lubricants for use at the facility could be made in reusable bulk containers. Any off-site recycling or off-site waste management could also be managed in bulk, which would greatly reduce the amount of waste containers purchased each year.

Strength of Focus: Currently, the soldiers that manage evacuated fluids as hazardous or non-hazardous waste do so well outside their given career fields. Soldiers need to spend more time on activities that help their careers by performing their military mission and becoming technically proficient in their jobs. Any military mechanic that regularly performs or supervises vehicle fluid and filter changing services will admit that it is a task they would gladly give up in order to perform tasks of greater complexity. A facility operated by contract personnel that are well motivated could provide this service at a profit and still provide a gigantic value to the government. In addition to fluid and filter evacuation and changing activities, a 50 point PMCS inspection could be performed as part of the service. This information could be reported back to the command electronically and provide valuable and impartial readiness information to unit commanders.

Summary: The cost of virgin products coupled with handling and disposal of coolants and lubricants could perhaps offset the cost for the evacuation and replacement service at no extra cost to the government. In other words the coolants and lubricants needed to maintain military vehicles ten years from now are running around inside the equipment right now. Standard software that is already available could be used to maintain records and schedule services. The reduced cost of fluid and filter change could encourage the increased frequency of fluid change and extend the life of the vehicles. This P2 Success Story is about one P2 project preparing the way for the next one. This on-site recycling experience has prepared us for greater challenges and inspired us to reach for higher goals.